GOVERNMENT OF INDIA
AGRICULTURE
LOK SABHA

UNSTARRED QUESTION NO:5870
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RESEARCH INSTITUTION
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Will the Minister of AGRICULTURE be pleased to state:

(a) whether the Research and Development work has been undertaken in the Agricultural Research Institutions of the country;

(b) if so, the details thereof;

(c) the total amount spent by these Research Institutions in the States during each of the last three years; and

(d) the contribution/outcome of research during the Eighth and Ninth Five Year Plan?

Answer

THE MINISTER OF STATE IN THE MINISTRY OF AGRICULTURE (DR. DEBENDRA PRADHAN)

(a) & (b) : At present the National Agricultural Research System comprising of 47 Central Institutes, 5 National Bureaux, 30 National Research Centres, 11 Project Directorates, 80 All India Coordinated Research Projects, 30 State Agricultural Universities and 1 Central Agricultural University for North Eastern Region is engaged in research in Crops, Horticulture Crops, Animal Sciences, Natural Resource Management, Agricultural Engineering and Fisheries.For development activities, agriculture being the state subject the respective Departments in each state undertake the developmental activities in agricultural sector. Central Government also provides support for the agricultural development programmes keeping in view the national priorities.

(c) Since the state-wise allocations are not made by this Department, the total expenditure incurred by research establishments during the last three years are as under :

(Rs. in crore)

Year	Plan	Non-Plan	AP Cess	Total
1997-98	323.01	351.04	21.32	695.37
1998-99	427.72	516.54	28.22	972.48
1999-2000	455.00	790.63	30.22	1275.85

(d) The contribution/outcome of research during Eighth and Ninth Five Year Plan are given in Annexe-I.

Annexe-I

Contribution/Outcome of Agricultural Research during Eighth and ongoing Ninth Five Year Plan

Crop Science

- 452 high yielding varieties and hybrids of various field crops were released during 8th plan. They comprised 222 varieties of cereals, 92 of pulses, 75 of oilseeds, 41 of fibre crops (cotton and jute), 12 of sugarcane and 10 of tabacco.

- During 9th plan period, so far 173 varieties/hybrids of cereals, 95 varieties of pulses and oilseeds and 38 of commercial crops were released for cultivation.

- Continued efforts to develop productive technology for risk prone rainfed areas led to the evolution of well adapted high yielding varieties of rice, pulses and oilseeds.

- High yielding varieties of basmati rice (Pusa basmati 1), durum wheat (PDW 223, PDW 215) and dicoccum wheat (DDK 1001) malt barley BCU 73 and confectionerygrade groundnut (BAU 13, TKG 19-A) were developed and released which helped in strengthening and sustaining the quantum of export.

- One of the significant achievement during the last one decade is the development and release of hybrids in rice. At present a total of 15 hybrids of rice have been released for cultivation. These hybrids have yield advantage of about 1.5 tonnes/ha.

- Tagging of two of the gall midge resistance genes, which would facilitate marker aided selection and near perfection achieved in the development of transformation protocols are some of the major achievements in the area of biotechnology.

- Region specific IPM modules have been developed for various pest intensive crops. Reproducible protocols developed for mass multiplication and release of the parasite Trichogramma and the predator Chrysoperla are some of the achievements of practical value. The successful IPM packages already developed for rice, cotton, sugarcane and pulses are being widely adopted.

- Many varieties of cereals and other crop varieties have resistance to important diseases and pests like resistance to leaf curl virus in cotton, blight resistance in rice, powdely mildew resistance in pulses.

- Breeder seed of different crops to the tune of 119460.91 q and 73561.43 were produced during 8th and 9th plan respectively.

Horticulture

- In mango, the variety Mutwar Pasand recorded the highest weight.Catalogue preparation has been started after evaluating the genetic resources of mango. In biological control of guava wilt, Pusa Mrida has been found promising for the control of disease as well as growth of plants. Microbudding technique has been standardized in Citrus for multiplication of healthy plants throughout the year.

- Six accessions tolerant to Sigatoka leaf spot have been identified in banana. A spacing of 1.6x1.6 m (3900 plants/ha) was found economical for CO 6 papaya to obtain high papain yield. A computer software has been developed for forecasting of grape diseases. A variety of pomegranate has been released for anadana purpose with the name `Amlidana`. Banana biscuits were prepared using Poovan banana puree. Powder from Monthan and Nendran banana was prepared and stored for usage as base material for other products. Trichoderma treated grape bunched remained fresh for a longer period than fungicide treated bunches.

- In vegetable crops two varieties of each of okra and tomato and one hybrid each of tomato, chilli and brinjal have been developed and included under AICVIP for multi-locational trials.In vitro propagation methods for the multiplication of pointed gourd have been standardized. Agro-techniques like spacing, nutritional requirements in cabbage, pea and okra have been developed. Integrated management of tomato fruit borer and a technique to get discrete symptoms of Alternaria blight have been developed.

- In mushroom two new strains of temperature tolerant white button mushroom have been released for commercial cultivation. The cultivation technology for two new mushroom have been developed.

- In potato, nine Bt transgenic lines were found to be resistant to Potato Tuber Moth (PTM)DNA fingerprints of all the commercial and 14 old indigenous varieties have been generated. Cropping systems for North Western hills of Shimla, Modipuram and Shillong have been developed. A three row sub soiler was designed and developed. Forecasting model have been developed for predicting the late blight disease appearance within 10 days of forecasting in western plains. Plant protection techniques for the control of black scruf, soft rot, dry rot have been developed.

- Two cassava hybrids have been recommended for release. In floriculture, 8 varieties of rose, 2 of gladiolus and 7 of chrysanthemum were released for commercial cultivation.

- In tissue culture studies for rapid multiplication of elite genotypes in coconut MYD and MOD gave good callus percentage (16.6 and 20.6 respectively) under 0.1m M concentration of 2,4-D. Survey on the incidence of eriophyid mite in Kerala indicated highest incidence in Trichur (77%) and Ernakulam (61%) districts while in Kottayam and Alapuzha districts it was 58 and 56% respectively. The process for making snowball tender nut has been developed. In varietal evaluation trial in oilpalm the pooled FFB yield varied from 7.81 to 11.61 ton of FFB/ha/yr and the maximum FFB yield was recorded in the cross combinations 18C x 2501 from Ivory Coast.

- A new variety of cashew Balli-2 from Goa was recommended for release. Micro-grafting technique has been standardized using in vitro raised seedlings as rootstock and asceptic nodal shoot tip cultures from mature tree source as micro scion. Panniyur-6 and Panniyur-7 in black pepper, RR-1 in cardamom, RCr-684, RCr-436, RCr-435 in Coriander, Guj Methi-1, RMt-303 in fenugreek Guj,cumin-3 in cumin and RF-101 in fennel and two varieties of seed spices viz., RCr-20 in coriander, Co-2 in fenugreek, were released.

- A quick method of clonal multiplication of cardamom suckers was standardized. It involves close planting of suckers (0.9 x 0.9cm) in trenches and fertilizer application of 75:75:150 kg NPK/3000 plants in two equal splits, regular plant protection measures, weeding, irrigation and mulching operations which yield 4-5 planting clonal units/tiller/year.

- In Isabgol one spray of Metalaxyl + two sprays of Mancozeb was found significantly superior in controlling mildew. Superiority of the treatment, organic manure either in the form of oilcake or FYM or vermicompost plus urea (1:1) in increasing leaf yield was observed.

Natural Resource Management

- Natural resources - their inventory and monitoring
- Sustainable - land use plans for agro-ecological sub regions
- Improvement in fertiliser use efficiency
- Use of bio-fertiliser through integrated plant nutrient systems
- Management and monitoring for sustainable productivity
- Water use efficiency and irrigation system management
- Drainage technology for saline and waterlogged soils
- Utilisation of poor qualaity irrigation water
- Model Watershed Development
- Agromet advisory services - weather based expert system
- Improvement in cropping intensity
- Development of agro-eco zone specific farming systems
- Development of agro-forestry system
- Climate change - its monitoring and management
- Cost effective methods for resource conservation

Agricultural Engineering

- A tractor mounted multi crop planter suitable for bold, medium and small seeds has been developed. The field capacity is 3.15 ha/day. A tractor mounted till planter which, is basically a seed-cum-fertilizer drill mounted on a rotavator has also been developed. It saves 20% cost of operation as compared to conventional method.

- A self propelled sprayer, tractor mounted sugarcane trash shredder, high capacity pigeon pea thresher and self propelled safflower harvester have been developed.

- Refinement of pneumatic planter, paddy thresher (IEP-3 model), high capacity multi-crop thresher, tractor front mounted reaper and bullock drawn seed-cum-fertilizer drill were undertaken at CIAE, Bhopal to improve their efficiency and reduce cost of manufacturing.

- Eight centres with prototype manufacturing workshop, manufactured 4730 manually operated, 344 animal drawn and 53 power operated equipment were manufactured by the Eight Prototype Manufacturing Workshops and over 5000 units were got fabricated through local manufacturers for Front Line Demonstration in farmers` fields.

- Large scale demonstrations of improved farm equipment namely Low Land Paddy Seeder, Tractor Mounted Sugarcane set cutter, Tractor Mounted Cultivator for interculture in cotton crop Tractor Mounted Multi-crop Planter and Self Propelled Riding type Rice Transplanter were conducted in farmers` fields.

- Studies were undertaken on soyflour, to identify texture and soybean groundnut and sunflower oils to see the solubility and effect of solvents on oil recovery. Process formulation for soymilk, ice-cream and soy-fortified salted biscuits were standardized.

- Refinements of power operated groundnut decorticator, grain pearler and integrated dal mill were undertaken.

- MERADO Oil expeller (1 t/day capacity) was used with bio-chemical treatments for higher oil recovery. Pre-treatment machines such as pre-grinder and blender-cum mixture and cooker with boiler were also designed and developed.

- An agro-processing centre has been established at CIPHET, Ludhiana with a mission to popularize available post harvest technology for food grains and oilseeds among the farmers, manufacturers etc. About 10 machines have been installed and demonstrated to visitors including, entrepreneurs/students, farmers etc.

- Designed and commissioned a 100-125 kg/ h capacity fully indigenous prawn and fish feed manufacturing pilot plant.

- Round the year studies on vegetable production using greenhouse technology; design and development of green house structure and evaluation for off season vegetable production; construction of low tunnels using bamboo and its evaluation for nursery raisings; development of open enclosure breeding system for carps, development of fish feeders and development and testing of plastic thermocole bee-hives under the Kangra valley of Himachal Pradesh were undertaken.

- Technologies for production of jaggery chocolate, jaggery patti, jaggery wheat flour extruded snacks and jaggery-besan snacks were developed and standardised. Technology for manufacturing of granular jaggery and liquid jaggery has also been standardised and brought under multi-location testing. Technology was developed to manufacture these products from immature and over matured sugarcane. Bucket shaped jaggery of 13-15 kg weight lumps stored in jaggery godown, using fresh burnt lime as desiccant remained good from March to August with little physico - chemical changes.

- Annual cotton quality update 2000 was brought out incorporating data of more than 1200 cotton samples along with statistical interpretations. Improvement of double roller gin was made by optimising roller and beater speeds for improvement of lint quality and

ginning out-turn. A tractor operated cotton stalk puller developed is being evaluated. CIRCOT Mumbai continued its participation in the AICCIP programmes by providing technological inputs on fibre and yarn quality. Technological Report on Major Trade Varieties of Cotton and standard cottons was brought out by collection, testing, and compilation of data and printing.

- CIRCOT Mumbai prepared thirteen new eco-friendly azo dyes using suitable safe intermediates and different couplers. Good quality binderless fibreboards were prepared from cotton stalk pulp. Eight samples of CIRCOT calibration cotton are being exported to Iran.

- With a view to develop eco-friendly technologies for boosting lac production, parasitising efficiency of exotic parasitoids at different doses was determined successfully for management of lac predators. Integration of lac culture with agricultural crops under lac based agro-forestry system as well as proper plant density for raising akashmani under lac cultivation has been determined at ILRI, Ranchi. Based on various productivity-linked attributes, six productive stocks of lac insects have been identified for different host plants.

- ORP studies and front line demonstration of various bullock drawn matching equipment, improved yokes and harnesses and hardened hoof shoes. Standardization of two-wheel bullock cart was done at CIAE Bhopal.Optimum draft requirement at varying payloads and surface conditions was also worked out.

- Studies on surge irrigation initiated. Designing of automated system for testing of pump and drippers and subsurface drainage system for CIAE Farm was undertaken and completed.

- The rice productivity in coastal saline and sodic clay soils of Andhra Pradesh was enhanced to more that 4 t/ha in a span of 4 years due to leaching out of excess salts by subsurface drainage system.

- Suitable surface drainage at Zonal Agricultural Research Station at Powerkheda under Tawa Command has been commissioned and study of their impact is under progress.

- In low-lands which are under the threat of runoff accumulation every year due to absence and infeasibility of creating a conventional drainage facility, a raised bed - Pond system of land configuration was studied and was proved to be successful for three successive years. The system permitted kharif cultivation, which was not possible earlier, and also provided water for supplemental irrigation in the rabi, which resulted in increased rabi yield.

Animal Science

- Census Data : Livestock census data bank integrated with the information system on Animal Genetic Resources of India (AGRI-IS) Systematic field surveys undertaken to assess the population status of the breeds, socio-economic condition of the farmers, production performance and interaction of the local ecology with the breeds. The in-situ conservation models for different species developed for implementation in respect of Spiti horses, Beetal goats, Nili Ravi buffalo, Sahiwal cattle and Kodu Adu Goats.

- Cattle : Genetic characterization of Sahiwal breed of cattle carried out using 20 highly polymorphic FAO recommended primers. Conservation and genetic improvement of 4 important Indigenous breeds of cattle (Hariana, Ongole, Gir and Tharparkar) undertaken in their native tract through Associated Herd Progeny Testing Programme. First lactation milk yield in 300 days and less, total yield, peak yield and lactation length in Frieswal cows averaged 2837.4 kg, 3013.2 kg, 14.2 kg and 318.6 days respectively.

- Buffalo: Molecular marker in buffaloes, heterologous (cattle) microsatellite primers on a panel of 20 buffaloes from Murrah, Mehsana, Nili-Ravi and Jaffarbadi breeds evaluated. First three top ranking sires of Murrah buffalo bulls identified.Semen of proven bulls to be used for nominated matings and also available for sale to breeding agencies.

- Goat: Characterization of Barbari goat done in its native tract. Breed descriptors defined and information on growth, reproduction and milk yield described.

- DNA Fingerprinting:Genetic fingerprinting profiles successfully used for establishing biological relationships, linkage analysis and phylogenetic relationship among related species. DNA finger printing analysis carried out on Barbari and Jamunapari goat.

- Poultry: Two native chicken breeds (Aseel and Kadaknath) and two exotic breeds (White Leghorn and Dahlem Red) and their crosses evaluated for immunocompetence traits. Selected and control lines of White Leghorn chicken were evaluated for their genetic biodiversity with the help of DNA methods.

- Camel: Biochemical polymorphism studied in double humped camel for haemoglobin transferrin, albumin, amylase, phospho-hexose- isomerase glucose 6- phosphate dehydrogenase and acid -phosphatase.

- Mithun: Major emphasis given on collection, evaluation and documentation of available mithun germplasm in the country. Physiological behaviour of the two rare animal of North Eastern region Yak and Mithun were studied. Initial indications are such that these two animals perform better if they are given protection against environmental stress and nutritional supplement.

- Sheep: Madras Red sheep improved through selection for mutton production. Madras Red sheep is one of the important breed of Tamil Nadu. Sheep skins are preferred in tanning due to better grains in finished leather.

- Commercial test cross (KRISHIBRO) from coloured pure line attained body weight of 1339g without any finisher ration with a feed conversion ratio of 1.96 and mortality of 2.62 percent at six weeks of age.

- Animal Health: In high producing animal, there is need to protection of fat supplement for better performance. Area specific mineral supplements were suggested for the states of Kerala and Tamilnadu to avoid the excretion of excess nutrients, which cause environmental problems. Measures to overcome problems of disorders were suggested as per the research information emerged from the Network Programme on Embryo Transfer Technology and Micronutrients.

- Semen freezing : Semen freezing protocol for higher post thaw motility and fertility developed in goats and a technique of semen preservation for field condition have been evolved which has a potential of commercial exploitation.

- Technologies for various value added milk and meat products have been developed with efficient processes and utilization of by-products from meat and milk.

- Animal Disease: The protective antibody status following vaccination in Liquid Phase Blocking ELISA (LPBE) was further evaluated and standardized for screening large number of serum samples. ELISA based IBR Kit and Brucella kits developed and released, showed significant results when used in the field and found superior than the conventional diagnostic methods .

- An exclusive hybridoma laboratory for the production of N and H protein based monoclonal antibodies to RPV and PPRV have been developed for use in the ELISA kits for national sero monitoring and sero surveillance programmes.

- The prevalence of Bovine Viral Diarrhea affecting cattle and buffaloes of indian population has been confirmed based on genomic detection, sequencing and sero-prevalence by ELISA. Similarly, viral genome of Bovine Immuno-deficiency Virus(BIV) has been detected in cattle. Aujeasky`s disease in swine was also identified by genome detection (gII region) in tonsillar epithelium of latently infected pigs. Sero-prevalence of the disease is evident as tested by blocking ELISA.

- Caprine Arthritis and Encephalitis (CAE) virus primers were designed & synthesized, Synovial membrane cultures were standardize for virus isolation.

- Complement fixation test based diagnostic kit COMPLEMENT FIXATION FOR EQUINE BABESIOSIS (COFEB) has t developed .

- A milk based bovine brucellosis ELISA kit has been indigenously developed for screening the milk samples.

- A powerful veterinary epidemiology software India.admas Epitrak in two Modules developed.

Fisheries

- The marine fish production in India during 1999 has been estimated by CMFRI at 2.44 million tonnes which is 8.6% (2,30,000 t) less compared to 1998. The pelagic group formed 52.7% of the total landings and demersal finfish, crustaceans and molluscs together 47.3%.

- A comprehensive survey and assessment of ornamental fish resources of the Lakshadweep was conducted, for the first time, in nine inhabited islands, Amini, Agatti, Bitra, Chetlat, Kadmat, Kalpeni, Kavaratti, Kiltan and Minicoy based on large samples collected by actually fishing in the lagoons. The results suggested that there is a vast scope for developing an ornamental fishery industry in the Lakshadweep islands for initiating the export market.

- Environmental perturbations and its impact on ecology of river Ganges, Yamuna, Hooghly, Haldi, and Tapti at various points were assessed and studies were made on hydro-biological, bio-chemical, micro-biological parameters to suggest minimal standards permissible for industrial wastes discharge into aquatic system to safeguard aquatic resources of riverine system.

- Valuable database on fish bio-diversity in some important river system in Kumaon and Garhwal regions of Central Himalayan, which has been linked with ecological indices have been collected. Potential seed collection sites of snow- trout have been pinpointed and quantify.

- Multiple cropping of carps with 10,000 fingerlings/ha stocking and 6 Species combination (catla, rohu, mrigal, silver carp, grass, carp & common carp) yielded 46.1% higher production than three species combination with same density and 103% higher than three species combination at 5000 nos./ha stocking density.

- Standardization of seed production technology and domestication of important marine fin-fish, the Asian seabass has opened up a new horizon in coastal aquaculture.

- Success has been achieved in artificially breeding snow-trout, a coldwater fish species after raising the broodstock in farm itself. It is the first attempt in the country as previously all breeding experiments were conducted with brooder collected from the nature.

- An average of 22% selection response per generation was observed after two generation of selective breeding in first line population of rohu, while 47.5% selection response was observed in second line base population after first generation of selective breeding. A total of 1.14 million of CIFA-IR1 spawn was produced and reared in nursery ponds.

- `Sagar Kripa` a fuel efficient fishing vessel designed by CIFT was handed over for commercial trials to Fishing Boat Owners` Association (co-operative society, Munambam) and the data received established a fuel saving of 13 to 15 % which confirmed the success of the design.

- A total of 83 students successfully completed the various Post-graduate and certificate programmes of CIFE during the year under report in the fields of Fisheries Resource Management, Inland Aquaculture,Mariculture, Freshwater Aquaculture, Post-Harvest Technology. A total of 89 students have been admitted during the year 2000-2001 for various Post-graduates and certificate courses offered by the CIFE.

Agricultural Economics and Policy Research

Agricultural Economics

- The National Centre for Agricultural Economics and Policy Research (NCAP) was established by ICAR in 1991.

- The Centre is guided in its policies by a high-level Research Advisory Committee comprising eminent professionals, a Management Committee and number of internal committees. Mandate of the Centre includes;

- Policy oriented research on:
(i) technology generation, diffusion and impact;
(ii) sustainable agricultural production systems;
(iii) interaction between technology and other policy instruments like incentives, investments, institutions, trade, etc; and
(iv) agricultural growth and adjustments.

- Strengthening agricultural economics research and teaching capability in state agricultural universities and ICAR institutes.

- Enhancing ICAR participation in agricultural policy decisions through policy-oriented research and professional interactions.

Agricultural Statistics

- The Indian Agricultural Statistical Research Institute of the ICAR is involved in Agricultural Statistics activitiesThe institute has completed following 5 projects and 35 research projects are in operation including 11 externally aided projects.

- Use of Remote Sensing Satellite Data in Crop Survey.

- Fertilizer Response Ratio for different Crops in India.

- Use of discriminant function of weather parameters for developing forecast model of rice crop

- Pilot study for developing Bayesian probability forecast model based on farmers appraisal data on wheat crop

- Estimation of flow and change in dynamic population

- Institute has made a remarkable progress in the direction of obtaining external funds for the research projects funded by AP Cess, NATP Revolving Fund, etc.Two externally funded projects have been completed entitled. A number of software packages released are : Statistical Packages for Agriculture Research (SPAR1),Agriculture Research Data Information System (ARDIS),Software for Mixed Models Analysis for animal breeding data (SMMA), Statistical Packages for Balanced Incomplete Block Design (SPBIBD Release 1.0) and Statistical Package for Factorial Experiments (SPFE).A National Information System for Agriculture Research Education (NISAGE) for State Agricultural University and Deemed Universities of ICAR is in the final stages of development.

- Short-term courses on various topics in the field of Agricultural Statistics and Computer applications are organised by the Institute. The purpose is to be enhance the research skills of National Agricultural Research System (NARS) scientists in the discipline of Agricultural Statistics and Computer Applications.These training(s) also helps in increasing the productivity of technical and administrative staff.